An Ethical Decision-making Process for Computing Professionals

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AN ETHICAL DECISION-MAKING PROCESS FOR COMPUTING PROFESSIONALS

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Abstract. Our comments focus on the ACM Code of Ethics and situate the Code within a general ethical decision-making process to specify the five steps which logically precede human action in ethical matters and determine that action, and the individual difference traits in these five steps which bear upon the resolution of an ethical problem and lead to morally responsible action. Our main purpose is to present a cognitive moral processing model which computing professionals can use to better understand their professional rights and duties. It is clear that the Code provides substantial guidance in the areas of intellectual property rights, unauthorized entry into computing systems, and privacy. In other areas, such as obscenity on bulletin-board systems, the Code is silent. An interactive software program which allows the user to see the ways in which the Code is integrated and instructive in the six-step moral decision-making process is accessible via the internet. Our secondary purpose is to reformulate the Code as a set of questions which allow the computing professional to see practices which diminish the human person as unethical and those which enhance the human person as ethical.

Ethical issues have beset humankind since human beings began living together because orderly, tranquil, and productive communities are not possible without rules as to what a person must do and what he/she may not do. With the passage of time, as communities grew larger, those rules became formalized into codes of conduct to assure that everyone in the community was instructed as to what their rights and duties were and into laws that specified the penalties for violating the ethical norms of the community which evolved as community life changed. When the practitioners of a given trade formed their own occupational communities they too developed codes of conduct necessary for the well-being of their members and others, as with the Hippocratic Oath for physicians. Later, when certain skills were acquired through formal educational processes and when the persons with those skills formed professional associations they soon recognized the need to establish standards of ethical conduct for their own protection and for the protection of the persons they serve.

The Association for Computing Machinery (ACM) first developed a code of ethics for its members in 1972 [Kremer, CPSC, p.3]. Twenty years later ACM revised the code to take into account the technological developments which had unfolded since the first code was adopted; the February 1993 issue of *Communications of the ACM* published an article [Anderson et al, pp.98-107] explaining how to use the new code.[1] Since the four co-authors served on the task force which drafted the Code, their remarks have more than the usual weight and significance. Their discussion follows the four-part organization of the Code itself: (1) general moral imperatives; (2) more specific professional responsibilities; (3) organizational leadership imperatives; and (4) compliance. By applying the Code to nine cases which address specific ethical issues for computing professionals, the authors are able to demonstrate why certain practices are morally and thus professionally unacceptable. In effect, they present the Code by using it as a set of tools for fleshing out ethical problems, but they make no effort to present the Code in the context of an ethical decision-making process.

In 1992 Oz [1992, pp.423-432] presented an analysis of the ACM Code of Ethics in the form of a comparison with the professional codes of four other computer societies.[2] Shortly thereafter Oz [1993, pp.709-726] published an analysis of the ACM Code along with three other codes relevant to computing professionals.[3] Martin and Martin [1994, pp.21-26] in 1994 presented an analysis of the Code in terms of ten common themes relating to the behavior of computing professionals in ethical matters. None of these authors, however, situate the Code in terms of the process by which ethical decisions are made.

Udas, Fuerst, and Paradice [pp.721-734] published an article utilizing the ACM Code of Ethics and the Code of Ethics of the Data Processing Management Association to develop a model for use in the construction of a survey instrument to elicit information from public sector MIS professionals. Dahlbom and Mathiassen [1994] compared the 1992 ACM Code of Ethics with the 1972 Code in which they deliberately employed a means-end approach. Gotterbarn [pp.81-89] examined the Software Engineering (SE) Code of Ethics and Professional Practice which has been approved "as the standard for teaching and practicing software engineering by the ACM and the IEEE-Computer Society." Gotterbarn called attention to the eight principles of the SE Code which

he said requires "the software engineer to use ethical judgment to act in a manner which is most consistent with the spirit of the Code of Ethics and Professional Practice, given the circumstances."

Kremer[4] used nine specific cases to assist computing professionals in the proper application of the ACM Code of Ethics. Collins and others [pp.81-91] employed Rawls' *Theory of Justice* to specify the duties of software providers, buyers, users, and the rest of society. They applied those duties to a case involving a regional hospital. Most recently, Gell [pp.69-81] suggested two additional imperatives to the Software Engineering Code of Ethics developed jointly by ACM and IEEE, and substituted different language in that Code to make it more nearly applicable to the field of medical informatics. Ladd [pp.207-227] proposed a comprehensive concept of moral responsibilities which he characterized as "consequentialist and agent-relative" and applied that concept to two cases of overdependence on computers. None of these authors attempts to locate the ACM Code of Ethics in a logical ethical decision-making process.

Walsham [pp.69-81] in 1996 critiqued the ACM Code on the basis of two principal theories of ethical conduct: deontology and consequentialism. Not surprisingly he found that the Code is deontological in nature since by definition it is an enumeration of rights (what is owed *by* others) and duties (what is owed *to* others). However, we disagree with his finding that certain items in the Code *per se* are consequentialist or utilitarian. A person who embraces deontology sees the items in the code as enumerating what is morally required (such as honesty; see Code Item 1.3) and what is morally prohibited (such as discrimination; see Item 1.4), *quite apart from the consequences of his/her behavior either personally or globally*. A person who adheres to consequentialism, on the other hand, sees the items in the Code as enumerating what is required and what is prohibited *strictly and only in terms of the consequences of his/her behavior either personally or globally*. The first type of person is a moral absolutist; the second is a moral relativist. Put differently, a person may be one or the other type, but the Code itself is deontological.

Maner, on the other hand, is directly concerned with the ethical decision-making process used by computing professionals. His website[5] supplies commentaries on the work of more than 60 specialists -- nearly all of who are not computing professionals -- who have addressed the issue of the proper procedure for rendering ethical decisions. In his "Heuristic Methods for Computer Ethics" which is available at his website Maner asserts that "... a step-by-step or procedural approach to ethical decision-making could be an especially good fit for computer professionals." Maner himself recommends a 12-*stage* process, though it is not clear why and how he differentiates stages from steps.

This article is not concerned with trying to understand, explain, or justify the behavior of computing professionals in terms of the ACM Code of Ethics in a way that would classify that behavior according to some ethical theory. Nor are we concerned with the origins of the various imperatives incorporated in the Code. Rather, we situate the Code itself within a general ethical decision-making process in order to specify: (1) the five steps which logically precede human action in ethical matters and determine that action; and (2) the individual difference traits in each of these five steps which bear upon the resolution of an ethical problem and lead to morally responsible

action. The overall purpose of this article is to present a cognitive moral processing model which computing professionals including the more than 80,000 ACM members world-wide[6] can use both as individuals and as members of work teams to reach a better understanding of their professional rights and duties. It is the ACM Code itself which supplies the data we use in this article and for that reason the Code is reproduced in Table 1.

A second and clearly subordinate purpose of this article is to reformulate the Code as a set of questions which allow the computing professional to see those practices which diminish the human person as unethical and those which enhance the human person as ethical.

The case-study method teaches ethical reasoning by exposing the computing professional to a problem with which that person is not directly and personally involved. Our method teaches ethical reasoning by taking the computing professional through a problem with which that person is directly and personally involved using the ACM Code at every step along the way.

This approach illuminates the strengths of the ACM Code of Ethics and points out its potential weaknesses. It is clear that the ACM Code provides substantial guidance in the areas of intellectual property rights, unauthorized entry into computing systems, and privacy. In other significant areas, such as the question of obscene materials on computer bulletin-board systems, the Code is silent.

We have developed the interactive software program DECISION.ACM which allows the user to see the ways in which the ACM Code of Ethics is integrated and is instructive in the six-step (including the action step) moral decision-making process. Unavoidably, this article sets forth the process in a way which suppresses its dynamic elements. By simulating those dynamic elements, DECISION.ACM which is written in GWBASIC allows the user to address the decision-making process in a way which much more closely approximates the experience of moving step by step toward a decision. The program does not coerce any decision in the six-step process, and allows the user to skip a step where the answer to the question posed in that step is obvious.

For the user who already has and uses GWBASIC, the program can be downloaded directly from www.pageout.net/user/www/e/o/eoboyle/DECISION.ACM. For the user who does not have and has not used GWBASIC, that program can be downloaded directly from www.pageout.net/user/www/e/o/eoboyle/GWBASIC.EXE as indicated above. Open GWBASIC, and "load" <F3> DECISION.ACM. Then "run" <F2>. To exit DECISION.ACM, press <control><break> and enter the command "system".

LOCATING THE ACM CODE IN A PERSONALIST DECISION-MAKING PROCESS

Human Intellect and Free Will.

In placing the ACM Code of ethics within a general ethical decision-making process, it is instructive to differentiate the two human faculties -- intellect and will -- which are used in resolving a moral problem and in acting in a morally responsible manner. As a discrete issue, resolving a moral problem is a task for the human intellect. The human intellect is shaped by direct personal experience and the word of others or authority. Authority figures such as parents and teachers begin informing one at an early age about the moral good. As a person matures, however, direct personal experiences play a larger role in instructing the intellect. A code of ethics, in effect, is the voice of one's professional peers speaking with authority [Behrman, pp.157-158].

Grisez and Shaw [pp.82-83] define the moral good as "that which fosters human **being** and **being more**, human living and living more fully." They define moral evil as "that which puts limits on human **being** and contracts human life." We employ this definition in the main section of this article because it conforms best to our own personalist philosophy and premise that *human beings* become more fully *human persons* in terms of both their individuality and sociality by turning outward and communicating and interacting with others. At the same time, we reject Blanshard's [p.88] definition of the moral good -- "the most comprehensive possible fulfillment and satisfaction of impulse-desire" -- because it is grounded in the philosophy of individualism in which autonomous, self-centered *human beings* become more fully *human individuals* by turning inward and becoming less burdened by interactions with others except when it serves their own individual self-interest. Ong's [p.200] observation that personalism originated in the electronic age whereas individualism emerged in the script age with its alphabetic movable types reinforces our conviction that personalism is better suited to the current information technology culture than is individualism.

The free will determines whether one acts in a ethically responsible manner. In order to act responsibly in matters of a moral nature, both a cognitive condition and a motivational condition are necessary: a person (1) must know and understand the good; and (2) also want and embrace the good. The examples of champions and mentors at times can motivate a person's will to follow the intellect especially in ethical dilemmas or in circumstances where the personal risks or losses from a specific action or series of actions may be quite significant. In brief, moral problems are resolved by an intellect which is informed about the good. A person acts in a morally responsible manner whenever his/her will follows a properly informed intellect. While we have separated these two human faculties to better understand their distinct roles, the two are inextricably intertwined in actual, everyday use. Haas [pp.5-10] put the role of the intellect and free will as follows: "The capacity to know the truth, which resides in the intellect, and to love it, which belongs in the will, are prerequisites for any moral act."

Moral Reasoning.

One dominant tradition of Western culture is that thought precedes action and determines it. The scientific method, for example, is grounded in this convention. Ideally, the same may be said for thought and action in ethical matters [Blum, pp.701-725]. The thought process used in making an ethical decision may be divided into five conceptually distinct and sequential stages: (1) perception, (2) discernment, (3) resolution, (4) assessment, and (5) decision.

Before proceeding, two points should be noted. First, deficiencies in thought or moral reasoning or earlier mistakes tend to be incorporated in later stages. Second, in the cognitive moral development field these five parts are addressed sequentially in various alternative models of moral decision-making. In practice, however, they often are dealt with simultaneously. Both James Rest and Lawrence Kohlberg, two prominent developmental psychologists who are leaders in the cognitive moral development domain, have constructed models of morality which center on psychological functioning. The four components of Rest's [pp.558-570] model are: (1) interpreting the situation; (2) determining what course of action to follow; (3) deciding what one intends to do; and (4) executing and implementing a plan of action. Shelton [pp.32-58] refers to these four components as sensitivity, judging, planning, and executing, and suggests a Christian model for the theory which Rest outlines. Kohlberg's [pp.52-73] five components are: (1) interpretation and selection of principles; (2) moral decision-making; (3) follow-through involving moral judgement; (4) follow-through involving nonmoral skills; and (5) moral action.

Our six-component model, which centers on the person, includes the five stages of thought in addition to action. This model resembles the Kohlberg and Rest models in some respects and differs in others. Four points should be noted about the differences. First, Rest and Kohlberg are more concerned with how persons develop morally as they age and mature. We are more concerned with how the human mind processes ethical information at a given time faced with the behavioral and organizational constraints of a specific situation. Second, the bulk of Kohlberg's work focused on the moral development of children[7] while our model reflects the accumulated experience of teaching ethics to university students. Third, our model underscores human freedom and shows how freedom expands with technological development -- a central reality for computing professionals -- and creates ethical problems previously not seen in the computing profession. Fourth, Rest and Kohlberg constructed models of morality intended to improve our understanding of moral development in general. Our model is specific to computing professionals and is intended to show where in the moral decision-making process the ACM Code of Ethics is pertinent.

SIX-STAGE PROCESS OF ETHICAL DECISION-MAKING

Stage 1: Moral Perception and Personal Knowledge of the Moral Good.

In our model, perception is the first of five stages before moral action is initiated [Blum pp.701-725]. Perception is defined as the ability to recognize that an ethical problem exists and that a person has some personal responsibility to respond to that problem. Perception varies from one person to the next in part because of differences in a person's knowledge of the moral good or in his/her own cognitive moral development. The ACM Code of Ethics may help with perception particularly if a person already is familiar with the Code's various norms of ethical conduct. To this extent, the Code becomes educational and, in point of fact, Anderson and others [p.98] present the ACM Code in just this light.

Given virtually the same external circumstances, persons with certain deficiencies in their cognitive moral development do not proceed past the perception stage of an ethical problem while others who are further along in their development move to the next stage.

Stage 2: Moral Discernment and Personal Ability to Think Logically.

The second stage is discernment wherein a person states the ethical problem clearly. One must be able to think logically in order to discern, particularly in so-called ethical hard cases and dilemmas. As with perception, people vary significantly and observably in discernment.

The ACM Code of Ethics is not likely to be instructive in this stage of the deliberative process because discernment is person-specific. However, as suggested previously, a champion or mentor can help discern the precise nature of the ethical problem a person faces. In any event, it is wasteful to proceed with an improperly or poorly specified problem because too often the outcome is deceptive.

Presenting an ethical problem as a hypothetical case scenario, which is commonly done in teaching ethics,[8] has one major shortcoming. In life, ethical issues are entangled and possibly hidden in many other matters both at work and at home [Bayles, p.3]. Further, the scenario may be so tightly drawn as to elicit responses to a highly specific issue in a controlled instructional environment without contributing to the development of the critical thinking skills necessary to deal with other issues outside the classroom. To act in a morally responsible manner, a person must be able to sort out the ethical questions from the rest of life. In this regard, the case method is wanting because the ethical issue already is set forth in explicit language.[9]

Stage 3: Moral Resolution and Personal Ability to Think Analytically.

The next stage is resolution wherein the complexities of the stated problem are tackled in order to arrive at an individual position which is personally defensible. At this stage, the ability to think analytically is crucial. The ACM Code of Ethics may help resolve a specific problem by suggesting cogent questions such as "Is the proposed way of resolving the problem harmful to others directly or indirectly (Code Item 1.2)?" or "Does the proposed resolution violate any law (Code Item 2.3)?"

Certitude is an important consideration in matters of resolution even when a person concludes that the problem cannot be resolved and therefore he/she need not proceed further toward action. By certitude, we do not mean knowing with absolute certainty; this is impossible in human affairs. Certitude means, instead, being able to defend a given resolution persuasively to others. It means being able to justify a specific resolution to one's own self, to that part of the intellect -- the conscience or inner voice -- which reminds us of the moral good.

Stage 4: Moral Assessment and Personal Ability to Assess One's Freedom.

The fourth stage is assessment. Assessment questions a person's freedom to act in a specific moral situation. The bioethicist Andre Hellegers [p.7] defined this issue as: "where no choices could be made, no choices need be made." By that Hellegers meant that strictly speaking no real moral problem exists unless a person has some freedom to choose. To illustrate, prior to the development of sophisticated life-support systems no decision need be made about withdrawal of life support because none could be made.

For computing professionals this means that, insofar as technology presents choices which previously did not exist, new developments in computing hardware and software will introduce the double-edged sword of new freedoms and never-before-seen ethical problems. For example, invasions of personal privacy which required enormous effort a few years ago have become easy and cost-efficient today. And just as the Hippocratic Oath has not been able to assure physicians that their moral development will keep pace with technological change, the ACM Code of Ethics is not likely to be of much help at this stage.

Martin and Martin's [1990, pp.96-108] characterization of computer technology as "value-laden," which is repeated by Martin and Holz [1991], confuses and misleads in that it does not direct attention to the critical role of technological *change* in presenting hitherto-unheard-of-choices with ethical dimensions. Parker [44-98], on the other hand, understands much better the role of technological change in raising new ethical issues for computing professionals. Assessment, in other words, is technology-specific. Increasingly, therefore, computing professionals must be aware of new developments particularly in the context of the history of technology in the computing field in order to handle the new freedoms properly. We refer to this competency as the ability to assess freedom.

Stage 5: Moral Decision and Personal Knowledge of One's Duties.

Decision is the fifth stage in the process of pondering an ethical problem. Decision questions a person's duty or obligation to act personally in the matter. The ACM Code of Ethics very likely is instructive at this stage as is some understanding of justice. Justice refers to the good habit of rendering to another that which is owed. A beginner can be supplied with a rudimentary knowledge of the basic elements of justice -- commutative justice, contributive justice, and distributive justice -- as they apply to the workplace and in the professions in just a few hours of formal instruction. The ACM may want to explore ways as to how this might be done for its members.

Hospers' [p.40] treatment of justice centers almost entirely on distributive justice, but leaves much to be desired because justice is defined improperly – "justice is getting what one deserves." Additionally, his treatment omits entirely contributive justice which is most important to our purposes here because contributive justice sets forth the obligation of the individual member to the group. Eight other articles appearing in the same book [see Ermann et al] under "justice" are of little help in clarifying the meaning of justice. The meaning of justice in the context of another professional code of ethics can be found in O'Boyle and Dawson [1992, pp. 925-929].

As with the third stage (resolution), the ACM Code of Ethics may be instructive in the decision stage. Notice that the first three sections of the Code enumerate the duties of the computing professional (1) in general, (2) in his/her professional life, and (3) in a leadership role. As Anderson and others [Anderson et al, p.104] observe, the difficulty is balancing obligations which, in a given situation, make for conflicting demands. As with resolution, certitude is necessary before a person may act.

Stage 6: Moral Action and Personal Willingness to Follow One's Intellect.

Action -- the sixth and final stage -- follows thought and is determined by it. In a narrow sense, at this stage, it is the free will rather than the human intellect which is engaged. The question no longer is, "What is the good in these circumstances?" but, "Is one willing to pursue the good in order to make one's actions conform to the good (including the values of organizations such as one's employer)?"

Courage is the willingness to make behavior conform to the good even when it is personally dangerous. If the first five stages have been handled competently, personal courage probably accounts at least in part for differences among persons as to how they act in the same circumstances. The example which a champion or a person's mentor sets at this stage can be decisive because approval and acceptance are basic human needs which certain actions, such as whistle-blowing, can undermine [Fisher and Price, pp.477-486]. The ethical cases presented by Andersen and his colleagues fail to capture the pressures a person will feel when asked to act unethically in the workplace.

Figure 1 summarizes the foregoing. The entire six-stage process is circular rather than linear. That is, a person's fundamental knowledge of the good is a prerequisite for sensing whether a moral problem exists and whether he/she has some personal responsibility in the matter. It also is determined by direct experience with the other stages, especially with the action stage.

While cognitive moral thought precedes and determines action, we are convinced that action, in turn, conditions thought. Because continuous technological change provides opportunities for action which were not feasible before, and therefore forces action in situations where none was possible before, computing professionals are compelled to continuously re-think the moral good and their obligations to others under changed circumstances.

A PERSONALIST INTERPRETATION OF THE ACM CODE OF ETHICS

By presenting the ACM Code as a set of tools and applying the Code to nine cases, Anderson and his co-authors imply that the typical ACM member and other computing professionals will know how to use those tools. Bayles (pp.21ff), for example, structures professional ethics significantly in terms of obligations: to clients, to third parties, and to the profession. Kultgen [p.240] states that professional codes of ethics in general specify the duties of members to clients, employers, colleagues, third parties, society, among others. We suggest, however, that some inexperienced members will not be able to use those tools effectively. At the same time, we are convinced that more can be done for them than simply by viewing the Code as a set of reminders as to one's moral obligations to other persons encountered professionally.

Accordingly, we have reformulated the various items of the Code as simplified questions. Following Grisez and Shaw [pp.82-83], we framed these questions in a way which defines as unethical any act or failure to act which diminishes the person of (1) another human being or (2) one's own self. More items in the Code warn against action which would diminish the person of another human than those relating to one's own self. Item 4.2 of the Code is omitted because this item alone relates not to the responsibilities of the individual members but to the duty of the ACM officers should a member violate the requirements of the Code. Table 2 displays this reconstruction of the Code; the numbers in parentheses link each question to a specific item in the Code. The questions have been framed to be self-explanatory to the typical computing professional.

We have one more comment on the Code itself before turning to our final remarks. By being so broad, Code Item 1.2 -- "avoid harm to others" -- can confuse as well as instruct. Our suggestion is simple enough. Item 1.2 should be viewed in the same light as the physician's fundamental norm of "first, do no harm" [Bayles, p.19]. In practice, this means that one should think before acting, which is the main foundation of our decision-making model. The "first" conveys the meaning that there is more to ethical conduct than just avoiding harm to others.

FINAL REMARKS

From the perspective of the computing professional who needs help in addressing a problem with an ethical dimension, the ACM Code of Ethics is instructive in three of the six stages of ethical decision-making: perception, resolution, and decision. It is not informative in the other three stages.

During the perception stage, the Code may be helpful especially if the individual already is familiar with the Code's various norms of ethical conduct and already has some basic knowledge of the moral good. With regard to resolution, the Code may be helpful by raising certain cogent questions such as, "Does the proposed resolution violate any law?" Some ability to think analytically is critically important at the resolution stage. By listing and elaborating upon the general, professional, and leadership obligations of computing professionals, the ACM Code is instructive in the decision stage. At the same time, the Code by itself is not helpful in the matter of balancing different obligations which, in a given set of circumstances, produce conflicting demands. Some understanding of the basic elements of justice likely is helpful at this stage in the decision-making process.

From the viewpoint of the organization which employs computing professionals, the ACM Code is useful in shaping professional behavior but is no guarantee that every professional employee will conduct him/herself in a morally appropriate manner. In order to create and maintain a workplace environment where professional employees routinely behave in ways which are morally appropriate, senior managers should be especially vigilant in three areas: hiring, training, and implementing.

As for hiring, the same skills in logic and problem-solving which are necessary for success as a computing professional are essential in addressing ethical problems. Moral perceptivity, however, is a different type of skill and senior managers are well advised to look for it specifically. Without moral perceptivity, even the most logical and analytical professional may not be aware that an ethical problem actually exists until it is too late to prevent an action or behavior which is morally inappropriate.

Without training sessions to learn how to apply the Code in various situations, the computing professional develops along the moral dimension by trial and error. This could have serious negative and perhaps irreversible consequences for both the individual and the organization. Training sessions organized as seminars using full-length feature films such as the ones mentioned above offer considerable promise in helping the individual sort out, identify, analyze, and resolve ethical issues in a context which is more challenging than the more commonly used hypothetical case scenario. In this regard, the Association for Computing Machinery is advised that its Code of Ethics is not helpful in two of the six stages of the ethical decision-making process -- discernment and assessment -- and that any training which it might sponsor or support should address those deficiencies.

Finally, implementing the Code so that it is operational on a daily basis is a continuing problem for any organization. We offer two suggestions. First, implementation of the ACM Code could be furthered by making an individual ethical audit part of the employee's periodic performance review. At this time, the individual may be asked to sign a personal statement affirming the Code.

Second, senior officials contribute positively to the moral environment of an organization when they conduct their affairs in ways which are above reproach. This is because the behavior of individuals in lower-level positions is powerfully influenced by the behavior of persons in authority. Nothing is more damaging to the moral environment of an organization than hypocrisy in the senior ranks.

Hiring people who have some understanding of ethical behavior, training them to recognize ethical behavior in the professional capacities within the organization, and demanding that they behave ethically, especially when they are advanced to positions of greater responsibility, are traits of an organization which takes ethics seriously. Serious deficiencies in these areas mean that any code of ethics by itself can become no more meaningful than a piece of paper to hang on the wall or to stick in the bottom drawer, and thereby quite unlikely to help computing professionals conduct themselves in a morally appropriate manner and thereby to develop more fully as human persons.

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ENDNOTES

1. There have been no changes to the Code since 1992. See www.acm.org/constitution/code.html.

2. Data Processing Management Association, Institute for Certification of Computer Professionals, Canadian Information Processing Society, and British Computer Society.

3. Processing Management Association, Institute for Certification of Computer Professionals, and Information Technology Association of America.

4. See www.cpsc.ucalgary.ca/~kremer/courses/451/ethics./htm.

5. See http://csweb.cs.bgsu.edu/maner/heuristics/toc.htm.

6. See the First Society in Computing. ACM: Association for Computing Machinery. June 26, 2001 download from www.acm.org/.

7. In a paper presented at an ACM meeting seven years before the revised Code was approved in 1992, Harvey [pp. 1-7] cites Kohlberg's six-stage model of moral development as strong reinforcement for enhancing the moral development skills of computing professionals through ethical training.

8. Kreie and Cronan [pp. 1-6] advocate using short scenarios involving information-technology issues to teach ethics to business owners and their employees.

9. For a pedagogy for teaching business ethics based on video-cassette versions of selected films such as *Wall Street*, *Tin Men*, *Silkwood*, *Norma Ray*, *Tucker*, and *Save the Tiger*, see O'Boyle and Dawson [1991, pp. 44-53].

TABLE 1. THE 24 MORAL IMPERATIVES OF THE 1992 ACM CODE OF ETHICS

General Moral Imperatives. *As an ACM member I will ...*
    1.1   Contribute to society and human well-being.
    1.2   Avoid harm to others.
    1.3   Be honest and trustworthy.
    1.4   Be fair and take action not to discriminate.
    1.5   Honor property rights including copyrights and patents.
    1.6   Give proper credit for intellectual property.
    1.7   Respect the privacy of others.
    1.8   Honor confidentiality.

More Specific Professional Responsibilities. *As an ACM computing professional I will ...*
    2.1   Strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work.
    2.2   Acquire and maintain professional competence.
    2.3   Know and respect existing laws pertaining to professional work.
    2.4   Accept and provide appropriate professional review.
    2.5   Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.
    2.6   Honor contracts, agreements, and assigned responsibilities.
    2.7   Improve public understanding of computing and its consequences.
    2.8   Access computing and communication resources only when authorized to do so.

Organizational Leadership Imperatives. *As an AMC member & organizational leader, I will ....*
    3.1   Articulate social responsibilities of members of an organizational unit and encourage full acceptance of those responsibilities.
    3.2   Manage personnel and resources to design and build information systems that enhance the quality of working life.
    3.3   Acknowledge and support proper and authorized uses of an organization's computing and communications resources.
    3.4   Ensure that users and those who will be affected by a system have their needs clearly articulated during the assessment and design of requirements. Later the system must be validated to meet requirements.
    3.5   Articulate and support policies that protect the dignity of users and others affected by a computing system.
    3.6   Create opportunities for members of the organization to learn the principles and limitations of computer systems.

Compliance with the Code. *As an ACM member I will ...*
    4.1   Uphold and promote the principles of the Code.
    4.2   Treat violations of this code as inconsistent with membership in the ACM.

Source: ACM Code of Ethics and Professional Conduct,
downloaded on June 20, 2001 from www.acm.org/constitution/code.html.

**FIGURE 1. SIX-STAGE PROCESS OF ETHICAL DECISION-MAKING:
ROLE OF THE ACM CODE OF ETHICS**

1. PERCEPTION ...... Is there an ethical problem?
          Presumes some knowledge of the good.

    ACM Code *provides strong cues and guidance*.

2. DISCERNMENT .. Am I able to express the problem clearly?
          Presumes some ability to think logically.

    ACM Code *is not likely to be instructive*.

3. RESOLUTION ...... Am I able to resolve the problem?
          Presumes some ability to think analytically.

    ACM Code *suggests some cogent questions*.

4. ASSESSMENT ...... Am I free to act in this matter?
          Presumes some ability to assess freedom.

    ACM Code *supplies little direction*.

5. DECISION .... Am I obliged to act in this matter?
          Presumes some knowledge of one's duties.

    ACM Code *provides some insight into one's duties*

6. ACTION .... Am I going to act in this matter?
          Presumes some willingness to follow one's intellect.

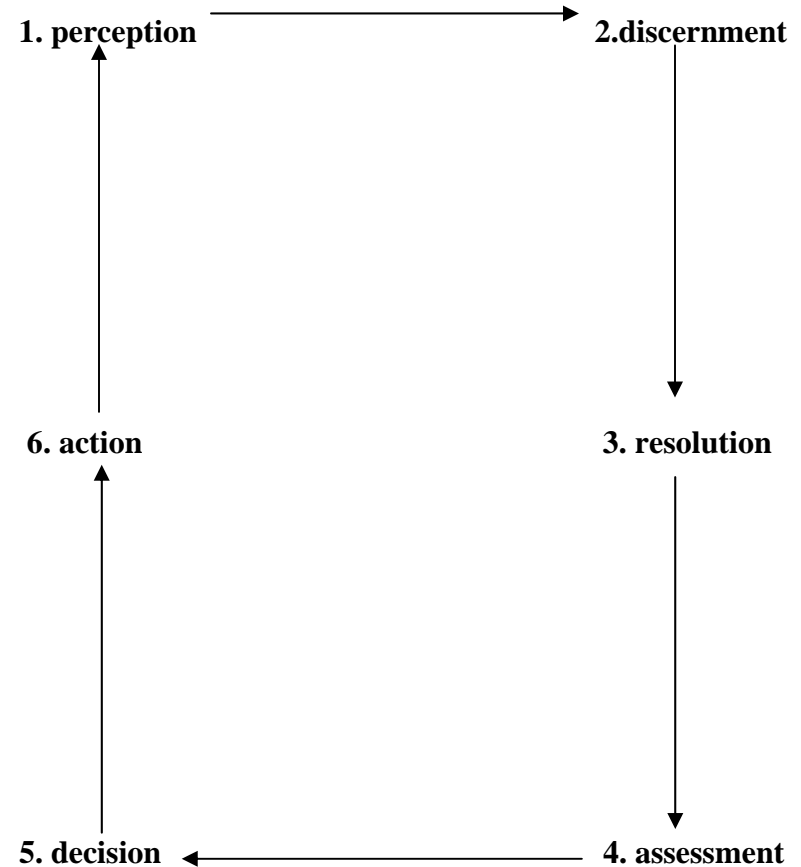   ACM Code *does not fortify one's will to pursue the good*.

1. perception → **2.discernment**
6. action   **3. resolution**
5. decision ← **4. assessment**

TABLE 2. DOES MY ACTION OR INACTION DIMINISH...

ANOTHER PERSON ...

deceiving that person or rendering him/her
less trusting or less secure? (1.3, 1.8)

treating that person arbitrarily or by
favoring someone else unduly? (1.4)

stealing what is rightfully his/hers? (1.5, 1.6)

revealing personal information about a person
to others without his/her permission or by
making him/her less able to confide? (1.7, 1.8)

causing other harm to befall that person,
including harm to his/her natural, social,
or workplace environment? (1.1, 1.2)

accepting from a peer less than what that
person is capable of producing? (2.4)

failing to brief that person properly about
the systems currently in use, their
alternatives, and any possible risks or
conflicts of interest? (2.5)

producing and furnishing less work than was
contracted for, agreed to, or assigned? (2.6)

refusing to help that person understand better
what computing is and what computing
professionals do? (2.7)

MY OWN PERSON BY ...

accepting or tolerating less than
what I am capable of producing or what
peers say I am capable of? (2.1, 2.4)

evading or avoiding opportunities to
improve my professional skills or by
        letting those skills erode? (2.2)

disregarding without good reason what
the law of the land requires of me as
a professional? (2.3)

breaching my personal values, beliefs,
convictions, or principles? (2.6)

DOES MY ACTION OR INACTION DIMINISH ...

ANOTHER PERSON BY ...   **MY OWN PERSON BY ...**

trespassing on that person's property by
accessing his/her files, software, systems,
accounts, or networks without explicit
authorization? (2.8)

failing to articulate to that person*
his/her responsibilities to society or to
the organization in terms of utilizing its
computing/communications resources? (3.1, 3.3)

designing, building, and implementing
computer systems that are damaging to the
total well-being of that person* or that do
not evoke the best that he/she is capable
of producing? (3.2, 3.5)

designing a computer system that does not
provide adequately for the needs of that
person** or not determining later the extent
to which those needs have been met? (3.4)

providing inadequate opportunities for the
professional development of that person*? (3.6)

failing to support that person (an ACM member)
in complying with the ACM Code of Ethics? (4.1)

 *: especially if that person is a subordinate.
**: especially if that person is a user.